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# *COMBINED ANTECEDENT VARIABLES AS MOTIVATING OPERATIONS WITHIN FUNCTIONAL ANALYSES*

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Functional analysis test conditions typically manipulate a single antecedent variable and an associated consequence to better isolate response–reinforcer relations. In some instances no problem behavior is observed, perhaps representing a false-negative finding. The present study evaluated one approach to assess potentially false-negative findings within functional analyses. Participants were exposed to single-antecedent functional analysis test conditions and combined-antecedent test conditions within a multielement design. Both participants engaged in problem behavior primarily during the combined-antecedent test conditions, and treatments matched to the results were effective in reducing problem behavior. Findings are discussed in terms of clinical implications of combining antecedent variables to further examine potentially false-negative functional analysis results.

DESCRIPTORS: motivating operations, antecedent variables, functional analysis, false-negative outcomes

One potential limitation of functional analyses is that a subset of individuals does not exhibit problem behavior during test conditions. These individuals may represent Type II errors or false negatives (Wacker, Berg, Harding, & Cooper-Brown, 2004). That is, some individuals engage in problem behavior in the natural setting but do not display those behaviors during analogue conditions. One reason false-negative errors may occur is that antecedent variables manipulated in test conditions do not function as motivating operations (MOs; Laraway, Snycerski, Michael, & Poling, 2003) and, thus, do not occasion problem behavior. Previous research has demonstrated that combinations of antecedent variables might motivate problem behavior (O'Reilly, Lacey, & Lancioni, 2000; Wacker et al., 1996). Manipulating multiple MOs within functional analyses might occasion problem behavior for some individuals for whom a false-negative finding would otherwise be obtained. The present study examined whether manipulating multiple antecedent variables within functional analysis test conditions would be one means of clarifying false-negative outcomes.

## METHOD

### SETTING, PARTICIPANTS, AND RESPONSE DEFINITIONS

Analyses were conducted while participants were patients in an inpatient psychology unit. Richard was a 17-year-old boy who had been diagnosed with a genetic disorder resulting in mental retardation and a seizure disorder. His problem behaviors included aggression and destruction in the form of throwing objects. Kevin was a 2-year 8-month-old boy who had been diagnosed with a disruptive behavior disorder. His problem behavior consisted of aggression. For both participants, *aggression* was defined as audible contact between an extremity and another person or displacement of an object that resulted in audible contact between that object and another person.

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### Data Collection and Interobserver Agreement

All sessions were scored via closed-circuit video monitoring using laptop computers that collected real-time data. A second observer independently collected interobserver agreement data during 26% of sessions for Richard and 27% of sessions for Kevin. Agreement percentages were calculated by separating the data into 10-s bins, calculating agreement within each bin, averaging across bins, and multiplying the result by 100%. Agreement averaged 98% for Richard (range, 95% to 100%) and 99% for Kevin (range, 87% to 100%).

### Procedure

#### *Preference and Demand Assessments*

High-preference (HP) and low-preference (LP) items were identified using a combination of assessment procedures described by Roane, Vollmer, Ringdahl, and Marcus (1998) and Fisher et al. (1992). For both participants, a *demand* was defined as an instruction to interact with items (HP or LP) in an LP activity. To establish relative preferences for activities with the HP and LP items, a demand assessment was conducted with Kevin in a paired-choice format similar to the preference assessment (details available on request). For Richard, the preference and demand assessments identified performing academic tasks (LP activity) using spelling flashcards (LP items) as the demand; for Kevin, taking pieces apart (LP activity) from a marble game (HP item) and sorting (LP activity) counting bears (LP item) by color were identified as demands.

#### *Functional Analysis*

Functional analysis procedures included free play, attention, escape, and tangible conditions (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994). Modifications were made to compare results from single-antecedent conditions to those from combined-antecedent conditions. The combined-antecedent conditions for each participant were based on descriptive analyses and results of previous assessments.

#### *Single-Antecedent Conditions*

Throughout the attention condition, HP and LP items remained available. In the tangible condition, access to the HP item was contingent on problem behavior while the LP item and attention remained available. During the escape condition with Kevin, the therapist instructed him to engage in the LP activity with the HP item. For Richard, demands consisted of the LP activity with the LP item. For both participants, therapists delivered attention during demands in the form of verbal prompting, praise, and encouragement on a variable-time 20-s schedule to control for a potential MO in the form of restricted attention. During breaks, the child was free to interact with the HP item in whatever manner he chose. In addition, one combined-antecedent test condition (described below) was included in each session block.

#### *Combined-Antecedent Conditions*

*Demand and diverted attention/contingent attention (Richard).* The therapist delivered an instruction to engage in the LP activity and informed Richard that while he worked, she was going to engage in another activity (e.g., read a magazine). The therapist then engaged in the stated activity and did not attend to Richard. Twenty seconds of attention was delivered contingent on the occurrence of problem behavior during the demand.

*Demand and restricted tangible item/contingent escape (Kevin).* Kevin's HP item was placed out of reach at the beginning of the session. The therapist then delivered an instruction to engage in the LP activity with the LP item. The therapist provided a 20-s break from the demand contingent on the occurrence of problem behavior. During the break, Kevin was free to play with the LP item in whatever manner he chose, and the HP item remained unavailable.

Treatment for both participants consisted of functional communication training (FCT)

with extinction, conducted in a nonconcurrent multiple baseline design. During FCT, the reinforcer that maintained problem behavior, as identified in the functional analysis, was made available contingent on appropriate requests. Problem behavior was neutrally blocked or ignored. FCT sessions were conducted in the context of the antecedent variables that evoked the target behavior during the functional analysis.

## RESULTS AND DISCUSSION

Results of Kevin's analysis are presented in Figure 1 (top). During the functional analysis, aggression was observed most often during the combined demand and restricted tangible item/contingent escape condition. No aggression was observed during the free-play or attention conditions, and it occurred infrequently during escape and tangible conditions. Aggression decreased to zero during the first three sessions of treatment. Following three consecutive treatment sessions without aggression, a work requirement was added in which a break was delivered only after Kevin completed one portion of the task after asking for a break. After a brief increase in aggression across four sessions, Kevin did not engage in aggression for six consecutive sessions. The work requirement was then increased to two portions of the task before breaks were delivered, and there was no increase in aggression. During the first session in which Kevin's care provider conducted the treatment, aggression increased to 0.2 responses per minute, after which it was not observed for the remainder of the analysis.

Kevin's use of appropriate requests also is shown in Figure 1. Although requests initially occurred at relatively high levels, the rate of requests decreased across sessions. There are at least two plausible explanations for this decrease. First, the increasing work requirement necessitated his spending a greater proportion of the session in instructional time, resulting in fewer opportunities to ask for breaks. Second, repeated exposure to the demand may have resulted in mastery of the skills required to complete the demand, decreasing the value of escape from the task.

Results of Richard's analysis are presented in Figure 1 (bottom). No problem behavior occurred during the escape or tangible conditions. Richard engaged in relatively high rates of problem behavior during the combined demand and diverted attention/contingent attention condition ($M$ = 0.5 responses per minute). Problem behavior was observed in the first two attention sessions; however, no problem behavior occurred subsequently in this condition. Following four sessions of treatment, Richard did not engage in problem behavior for three consecutive sessions. Appropriate requests also increased from zero in the first treatment session to an average of 0.7 per minute during the final three sessions.

The purpose of the current study was to evaluate the potential contributions of combining common functional analysis antecedent variables within test conditions. Only one of the consequences associated with the two antecedent variables was delivered contingent on problem behavior. It is not clear from the current data whether the consequence associated with the other antecedent variable from the combined-antecedent test condition would have also functioned as a reinforcer for problem behavior in the presence of a second antecedent variable. Also, although activity preference across the demand escape and demand and restricted tangible item/contingent escape conditions was held constant for Kevin (i.e., both were LP), the topography of the two activities differed. This procedure introduced an additional variable, so it is not possible to account for changes in his behavior solely by restricted access to the HP activity. These limitations may be areas for future research.

For both participants, elevated rates of problem behavior were observed within the combined-antecedent test conditions, whereas little or no problem behavior was observed in

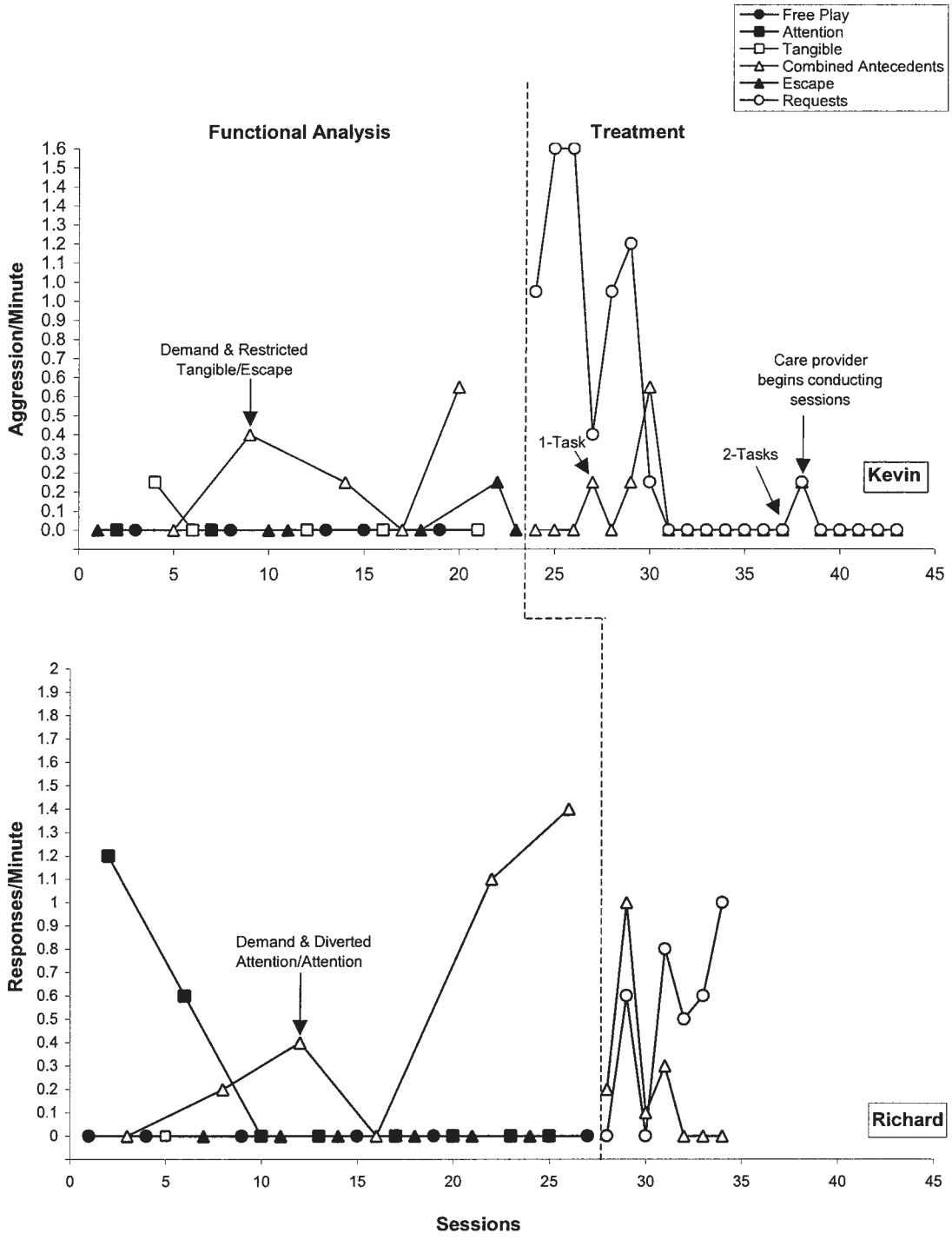


Figure 1. The rate of problem behavior during free play (filled circles), diverted attention/contingent attention (filled squares), demand escape (filled triangles), restricted tangible item/contingent tangible item (open squares) and combined-antecedent (open triangles) conditions. Appropriate requests during Phase 2 are depicted as open circles.

control or single-antecedent test conditions. Thus, failure to include the combined-antecedent variables would likely have resulted in false-negative findings for these participants. These results suggest that functional analyses that combine selected pairs of antecedent variables may clarify outcomes when standard test conditions do not result in problem behavior. It may be the case that the presence of combined antecedent variables was more analogous to the MOs in the natural environment that evoked problem behavior. Because the manner in which combinations of antecedent variables operate is likely to be idiosyncratic, developing preassessment strategies that aid the identification of combinations with elevated potential to precipitate problem behavior is an important topic for future research.

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